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April 9, 2018

Melanie A. Bachman, Esq.
Executive Director/Staff Attorney
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **EM-VER-020-180126 – 12 Nepaug Road, Burlington, Connecticut**

Dear Ms. Bachman:

In preparation for installation of the cell site modifications approved in EM-VER-020-180126, the Cellco Partnership d/b/a Verizon Wireless' ("Cellco") construction team discovered that the platform mounting system at this facility needed to be replaced.

Attached is a Structural Analysis Report confirming that the tower can support the approved equipment modifications and the new platform mounting system.

If you have any questions or need any additional information regarding this facility please do not hesitate to contact me.

Sincerely,



Kenneth C. Baldwin

Attachment
Copy to:
Tim Parks

17869359-v1



Date: April 02, 2018

Charles McGuirt
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
(724) 416-2000

Subject: Structural Analysis Report

Carrier Designation: Verizon Wireless Co-Locate
Carrier Site Number: 118016
Carrier Site Name: Burlington West CT

Crown Castle Designation: Crown Castle BU Number: 845993
Crown Castle Site Name: BURLINGTON-NEPAUG ROAD
Crown Castle JDE Job Number: 419584
Crown Castle Work Order Number: 1549730
Crown Castle Order Number: 377565 Rev. 6

Engineering Firm Designation: Crown Castle Project Number: 1549730

Site Data: 12 Nepaug Road, Burlington, Hartford County, CT
Latitude 41° 46' 56.86", Longitude -72° 59' 22.68"
120 Foot - Monopole Tower

Dear Charles McGuirt,

Crown Castle is pleased to submit this "Structural Analysis Report" to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 1549730, in accordance with order 377565, revision 6.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 120 mph converted to a nominal 3-second gust wind speed of 93 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B and Risk Category II were used in this analysis.

All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

We at Crown Castle appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by: Emma McCarty / KB

Respectfully submitted by:

Terry P. Styran, P.E.
Senior Project Engineer



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1) INTRODUCTION

This tower is a 120 ft Monopole tower designed by Engineered Endeavors, Inc. and mapped by FDH in February of 2016. The original design and wind speed are unknown.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a 3-second gust wind speed of 93 mph with no ice, 50 mph with 1 inch ice thickness and 60 mph under service loads, exposure category B.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
99.0	99.0	3	alcatel lucent	RRH2x60-700	2	1-5/8	-
		3	alcatel lucent	RRH4X45-AWS4 B66			
		6	commscope	JAHH-65B-R3B			
		3	nokia	AIRSCALE RRH 4T4R B5 160W			
		2	rfs celwave	DB-T1-6Z-8AB-0Z			
		1	Site Pro Mounts	RMQP-4096-HK			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
119.0	119.0	3	ericsson	RRUS-11	12 2 2	1-5/8 7/8 1/2	1
		1	gps	GPS_A			
		3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP13519			
		6	powerwave technologies	LGP21401			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 1201-1]			
109.0	110.0	3	alcatel lucent	PCS 1900MHZ 4X45W 65MHZ	3 1	1-1/4 7/8	2
		6	alcatel lucent	RRH2X50-800			
		3	alcatel lucent	TD-RRH8X20-25			
		3	kmw communications	ETCR-654L12H6 w/ Mount Pipe			
	109.0	1	tower mounts	Platform Mount [LP 1201-1]	-	-	1
99.0	99.0	3	antel	BXA-171085-8BF-EDIN-2 w/ Mount Pipe	6	1-5/8	3

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		3	antel	BXA-70063-6CF-2 w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		1	tower mounts	Platform Mount [LP 1201-1]			
		6	antel	LPA-80080/4CF	6	1-5/8	1
88.0	90.0	3	commscope	LNx-6515DS-A1M w/ Mount Pipe	7	1-5/8	1
		3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe			
		3	ericsson	ERICSSON AIR 21 B4A B2P w/ Mount Pipe			
	88.0	1	tower mounts	T-Arm Mount [TA 602-3]			

- Notes:
 1) Existing Equipment
 2) Reserved Equipment
 3) Equipment To Be Removed; Not Considered In This Analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
<i>Information Unavailable</i>						

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Jaworski Geotech, Inc.	4551029	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	FDH Velocitel (Mapped)	6171674	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	URS	5072131	CCISITES
4-TOWER MANUFACTURER DRAWINGS	FDH Velocitel (Mapped)	6172249	CCISITES

3.1) Analysis Method

tnxTower (version 7.0.5.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

- 1) Tower and structures were built in accordance with the manufacturer's specifications.
- 2) The tower and structures have been maintained in accordance with the manufacturer's specification.

- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. Crown Castle should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	120 - 97	Pole	TP28.93x22.69x0.1875	1	-8.68	1079.70	17.6	Pass
L2	97 - 48	Pole	TP39.7x27.5729x0.25	2	-21.30	1957.24	56.6	Pass
L3	48 - 0	Pole	TP51.04x38.0569x0.3125	3	-33.67	3154.51	58.1	Pass
							Summary	
						Pole (L3)	58.1	Pass
						Rating =	58.1	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	50.6	Pass
1	Base Plate	0	66.3	Pass
1	Base Foundation (Structural)	0	49.3	Pass
1	Base Foundation (Soil Interaction)	0	43.2	Pass

Structure Rating (max from all components) =	66.3%
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Notes:

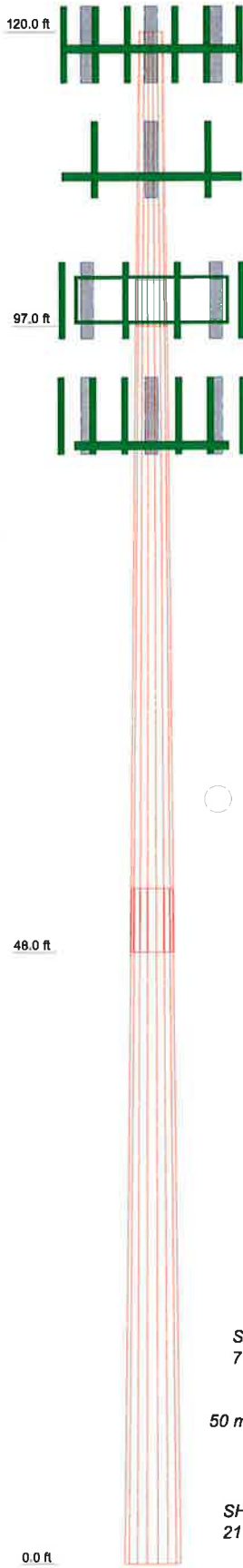
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

APPENDIX A
TNXTOWER OUTPUT

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	23.00	18	0.1875	3.62	22.6900	28.9300	A572-65	1.2
2	52.62	18	0.2500	4.96	27.5729	39.7000	A572-65	4.7
3	52.96	18	0.3125	38.0569	51.0400			7.9
								13.6



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) 7770.00 w/ Mount Pipe	119	PCS 1900MHZ 4X45W 65MHZ	109
(2) 7770.00 w/ Mount Pipe	119	(3) 6' x 2" Mount Pipe	109
(2) 7770.00 w/ Mount Pipe	119	(2) 6' x 2" Mount Pipe	109
AM-X-CD-16-65-00T-RET w/ Mount Pipe	119	(3) 6' x 2" Mount Pipe	109
AM-X-CD-16-65-00T-RET w/ Mount Pipe	119	Platform Mount [LP 1201-1]	109
AM-X-CD-16-65-00T-RET w/ Mount Pipe	119	(2) LPA-80080/4CF	99
AM-X-CD-16-65-00T-RET w/ Mount Pipe	119	(2) LPA-80080/4CF	99
GPS_A	119	(2) LPA-80080/4CF	99
(2) LGP21401	119	(2) JAHH-65B-R3B	99
(2) LGP21401	119	(2) JAHH-65B-R3B	99
(2) LGP21401	119	(2) JAHH-65B-R3B	99
DC6-48-60-18-8F	119	RRH2x60-700	99
(2) LGP13519	119	RRH2x60-700	99
(2) LGP13519	119	RRH2x60-700	99
(2) LGP13519	119	RRH4X45-AWS4 B66	99
RRUS-11	119	RRH4X45-AWS4 B66	99
RRUS-11	119	RRH4X45-AWS4 B66	99
RRUS-11	119	RRH4X45-AWS4 B66	99
6' x 2" Mount Pipe	119	AIRSCALE RRH 4T4R B5 160W	99
6' x 2" Mount Pipe	119	AIRSCALE RRH 4T4R B5 160W	99
4' x 3" Pipe Mount	119	AIRSCALE RRH 4T4R B5 160W	99
4' x 3" Pipe Mount	119	(2) DB-T1-6Z-8AB-0Z	99
4' x 3" Pipe Mount	119	Platform Mount [LP 1301-1]	99
Platform Mount [LP 1201-1]	119	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	88
ETCR-654L 12H6 w/ Mount Pipe	109	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	88
ETCR-654L 12H6 w/ Mount Pipe	109	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	88
ETCR-654L 12H6 w/ Mount Pipe	109	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	88
(2) RRH2X50-800	109	LNX-6515DS-A1M w/ Mount Pipe	88
(2) RRH2X50-800	109	LNX-6515DS-A1M w/ Mount Pipe	88
(2) RRH2X50-800	109	LNX-6515DS-A1M w/ Mount Pipe	88
TD-RRH8X20-25	109	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	88
TD-RRH8X20-25	109	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	88
TD-RRH8X20-25	109	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	88
PCS 1900MHZ 4X45W 65MHZ	109	ERICSSON AIR 21 B4A B2P w/ Mount Pipe	88
PCS 1900MHZ 4X45W 65MHZ	109	T-Arm Mount [TA 602-3]	88

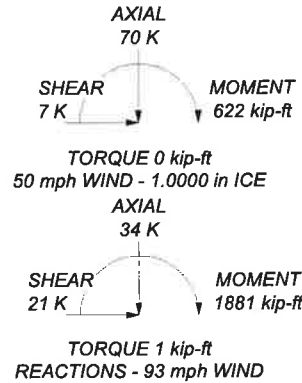
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 93 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 58.1%

ALL REACTIONS ARE FACTORED



<p>CROWN CASTLE The Pathway to Possible</p>	<p>Crown Castle 2000 Corporate Drive Canonsburg, PA 15317 Phone: (724) 416-2000 FAX:</p>	<p>Job: BU 845993 Project: WO 1549730 Client: Crown Castle USA, Inc. Drawn by: emccarty App'd: Code: TIA-222-G Date: 04/02/18 Scale: N Path: R:\ISA Models - Letters\Work Area\FMcCarthy\WIP\845993\WO1549730\845993.dwg Dwg No.:</p>
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Tower Input Data

There is a pole section.

This tower is designed using the TIA-222-G standard.

The following design criteria apply:

- 1) Tower is located in Hartford County, Connecticut.
- 2) Basic wind speed of 93 mph.
- 3) Structure Class II.
- 4) Exposure Category B.
- 5) Topographic Category 1.
- 6) Crest Height 0.00 ft.
- 7) Nominal ice thickness of 1.0000 in.
- 8) Ice thickness is considered to increase with height.
- 9) Ice density of 56 pcf.
- 10) A wind speed of 50 mph is used in combination with ice.
- 11) Temperature drop of 50 °F.
- 12) Deflections calculated using a wind speed of 60 mph.
- 13) A non-linear (P-delta) analysis was used.
- 14) Pressures are calculated at each section.
- 15) Stress ratio used in pole design is 1.
- 16) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification ✓ Use Code Stress Ratios ✓ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric	Distribute Leg Loads As Uniform Assume Legs Pinned ✓ Assume Rigid Index Plate ✓ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension ✓ Bypass Mast Stability Checks ✓ Use Azimuth Dish Coefficients ✓ Project Wind Area of Appurt. Autocalc Torque Arm Areas Add IBC .6D+W Combination ✓ Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder	Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation ✓ Consider Feed Line Torque Include Angle Block Shear Check Use TIA-222-G Bracing Resist. Exemption Use TIA-222-G Tension Splice Exemption <div style="text-align: center; background-color: #e0e0e0; padding: 2px;">Poles</div> ✓ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
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Tapered Pole Section Geometry

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L1	120.00-97.00	23.00	3.62	18	22.6900	28.9300	0.1875	0.7500	A572-65 (65 ksi)
L2	97.00-48.00	52.62	4.96	18	27.5729	39.7000	0.2500	1.0000	A572-65 (65 ksi)
L3	48.00-0.00	52.96		18	38.0569	51.0400	0.3125	1.2500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L1	23.0400	13.3918	856.7181	7.9884	11.5265	74.3258	1714.5635	6.6972	3.6634	19.538
L2	29.3763	17.1054	1785.3331	10.2036	14.6964	121.4807	3573.0155	8.5543	4.7617	25.396
	40.3124	31.3036	6154.9624	14.0048	20.1676	305.1906	12318.023	15.6548	6.5472	26.189
L3	39.8787	37.4377	6738.3194	13.3993	19.3329	348.5416	13485.505	18.7224	6.1480	19.674
	51.8274	50.3153	16357.795	18.0083	25.9283	630.8853	32737.114	25.1625	8.4330	26.986

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontal	Double Angle Stitch Bolt Spacing Redundants
ft	ft ²	in					in	in	in
L1 120.00-97.00				1	1	1			
L2 97.00-48.00				1	1	1			
L3 48.00-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter r in	Perimeter r in	Weight plf

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _A A _A ft ² /ft	Weight plf
119							
LDF4-50A(1/2)	A	No	Inside Pole	119.00 - 4.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
LDF5-50A(7/8)	A	No	Inside Pole	119.00 - 4.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
LDF7-50A(1-5/8)	A	No	Inside Pole	119.00 - 4.00	12	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
109 R							
HB114-08U3M12-XXXF(7/8)	A	No	Inside Pole	109.00 - 0.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
HB114-1-08U4-M5F(1-1/4)	A	No	Inside Pole	109.00 - 0.00	3	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
*** 99 P***							
LDF7-50A(1-5/8)	C	No	Inside Pole	99.00 - 4.00	6	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00
HB158-1-08U8-S8J18(1-5/8)	C	No	Inside Pole	99.00 - 4.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C _A A _A ft ² /ft	Weight plf
88 LDF7-50A(1-5/8)	B	No	Inside Pole	88.00 - 4.00	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	B	No	Inside Pole	88.00 - 4.00	1	No Ice	0.00	1.07
						1/2" Ice	0.00	1.07
						1" Ice	0.00	1.07
*** ***								

Feed Line/Linear Appurtenances Section Areas

Tower Section n	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	120.00-97.00	A	0.000	0.000	0.000	0.000	0.29
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.02
L2	97.00-48.00	A	0.000	0.000	0.000	0.000	0.75
		B	0.000	0.000	0.000	0.000	0.24
		C	0.000	0.000	0.000	0.000	0.37
L3	48.00-0.00	A	0.000	0.000	0.000	0.000	0.70
		B	0.000	0.000	0.000	0.000	0.26
		C	0.000	0.000	0.000	0.000	0.33

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section n	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	120.00-97.00	A	2.252	0.000	0.000	0.000	0.000	0.29
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.02
L2	97.00-48.00	A	2.162	0.000	0.000	0.000	0.000	0.75
		B		0.000	0.000	0.000	0.000	0.24
		C		0.000	0.000	0.000	0.000	0.37
L3	48.00-0.00	A	1.931	0.000	0.000	0.000	0.000	0.70
		B		0.000	0.000	0.000	0.000	0.26
		C		0.000	0.000	0.000	0.000	0.33

Feed Line Center of Pressure

Section	Elevation ft	CP _x in	CP _z in	CP _x Ice in	CP _z Ice in
L1	120.00-97.00	0.0000	0.0000	0.0000	0.0000
L2	97.00-48.00	0.0000	0.0000	0.0000	0.0000
L3	48.00-0.00	0.0000	0.0000	0.0000	0.0000

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
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Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft		CA _{AA} Front ft ²	CA _{AA} Side ft ²	Weight K
119									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00	0.0000	119.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			0.00			Ice	6.61	5.71	0.16
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00	0.0000	119.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			0.00			Ice	6.61	5.71	0.16
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00	0.0000	119.00	No Ice	5.75	4.25	0.06
			0.00			1/2"	6.18	5.01	0.10
			0.00			Ice	6.61	5.71	0.16
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00	0.0000	119.00	No Ice	8.26	6.30	0.07
			0.00			1/2"	8.82	7.48	0.14
			0.00			Ice	9.35	8.37	0.21
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00	0.0000	119.00	No Ice	8.26	6.30	0.07
			0.00			1/2"	8.82	7.48	0.14
			0.00			Ice	9.35	8.37	0.21
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.00	0.0000	119.00	No Ice	8.26	6.30	0.07
			0.00			1/2"	8.82	7.48	0.14
			0.00			Ice	9.35	8.37	0.21
GPS_A	A	From Leg	4.00	0.0000	119.00	No Ice	0.26	0.26	0.00
			0.00			1/2"	0.32	0.32	0.00
			0.00			Ice	0.39	0.39	0.01
(2) LGP21401	A	From Leg	4.00	0.0000	119.00	No Ice	1.10	0.21	0.01
			0.00			1/2"	1.24	0.27	0.02
			0.00			Ice	1.38	0.35	0.03
(2) LGP21401	B	From Leg	4.00	0.0000	119.00	No Ice	1.10	0.21	0.01
			0.00			1/2"	1.24	0.27	0.02
			0.00			Ice	1.38	0.35	0.03
(2) LGP21401	C	From Leg	4.00	0.0000	119.00	No Ice	1.10	0.21	0.01
			0.00			1/2"	1.24	0.27	0.02
			0.00			Ice	1.38	0.35	0.03
DC6-48-60-18-8F	A	From Leg	4.00	0.0000	119.00	No Ice	0.79	0.79	0.02
			0.00			1/2"	1.27	1.27	0.04
			0.00			Ice	1.45	1.45	0.05
(2) LGP13519	A	From Leg	4.00	0.0000	119.00	No Ice	0.29	0.18	0.01
			0.00			1/2"	0.36	0.24	0.01
			0.00			Ice	0.44	0.31	0.01
(2) LGP13519	B	From Leg	4.00	0.0000	119.00	No Ice	0.29	0.18	0.01
			0.00			1/2"	0.36	0.24	0.01
			0.00			Ice	0.44	0.31	0.01
(2) LGP13519	C	From Leg	4.00	0.0000	119.00	No Ice	0.29	0.18	0.01
			0.00			1/2"	0.36	0.24	0.01
			0.00			Ice	0.44	0.31	0.01
RRUS-11	A	From Leg	1.00	0.0000	119.00	No Ice	2.78	1.19	0.05
			0.00			1/2"	2.99	1.33	0.07
			0.00			Ice	3.21	1.49	0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	CaAa Front ft ²	CaAa Side ft ²	Weight K	
RRUS-11	B	From Leg	1.00	0.0000	119.00	No Ice	2.78	1.19	0.05
			0.00			1/2"	2.99	1.33	0.07
			0.00			Ice	3.21	1.49	0.09
RRUS-11	C	From Leg	1.00	0.0000	119.00	1" Ice	2.78	1.19	0.05
			0.00			No Ice	2.99	1.33	0.07
			0.00			1/2"	3.21	1.49	0.09
6' x 2" Mount Pipe	A	From Leg	4.00	0.0000	119.00	Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
6' x 2" Mount Pipe	B	From Leg	4.00	0.0000	119.00	1" Ice	1.43	1.43	0.02
			0.00			No Ice	1.92	1.92	0.03
			0.00			1/2"	2.29	2.29	0.05
6' x 2" Mount Pipe	C	From Leg	4.00	0.0000	119.00	Ice	1.43	1.43	0.02
			0.00			No Ice	1.92	1.92	0.03
			0.00			1/2"	2.29	2.29	0.05
4' x 3" Pipe Mount	A	From Leg	0.50	0.0000	119.00	1" Ice	1.00	1.00	0.03
			0.00			No Ice	1.25	1.25	0.04
			0.00			1/2"	1.50	1.50	0.05
4' x 3" Pipe Mount	B	From Leg	0.50	0.0000	119.00	Ice	1.00	1.00	0.03
			0.00			No Ice	1.25	1.25	0.04
			0.00			1/2"	1.50	1.50	0.05
4' x 3" Pipe Mount	C	From Leg	0.50	0.0000	119.00	1" Ice	1.00	1.00	0.03
			0.00			No Ice	1.25	1.25	0.04
			0.00			1/2"	1.50	1.50	0.05
Platform Mount [LP 1201-1]	B	None		0.0000	119.00	Ice	23.10	23.10	2.10
						No Ice	26.80	26.80	2.50
						1/2"	30.50	30.50	2.90
*** 109 R *** ETCR-654L12H6 w/ Mount Pipe	A	From Leg	4.00	0.0000	109.00	1" Ice	13.27	6.54	0.10
			0.00			No Ice	13.88	7.71	0.19
			1.00			1/2"	14.45	8.61	0.29
ETCR-654L12H6 w/ Mount Pipe	B	From Leg	4.00	0.0000	109.00	Ice	13.27	6.54	0.10
			0.00			No Ice	13.88	7.71	0.19
			1.00			1/2"	14.45	8.61	0.29
ETCR-654L12H6 w/ Mount Pipe	C	From Leg	4.00	0.0000	109.00	1" Ice	13.27	6.54	0.10
			0.00			No Ice	13.88	7.71	0.19
			1.00			1/2"	14.45	8.61	0.29
(2) RRH2X50-800	A	From Leg	4.00	0.0000	109.00	Ice	1.70	1.28	0.05
			0.00			No Ice	1.86	1.43	0.07
			1.00			1/2"	2.03	1.58	0.09
(2) RRH2X50-800	B	From Leg	4.00	0.0000	109.00	1" Ice	1.70	1.28	0.05
			0.00			No Ice	1.86	1.43	0.07
			1.00			1/2"	2.03	1.58	0.09
(2) RRH2X50-800	C	From Leg	4.00	0.0000	109.00	Ice	1.70	1.28	0.05
			0.00			No Ice	1.86	1.43	0.07
			1.00			1/2"	2.03	1.58	0.09
TD-RRH8X20-25	A	From Leg	4.00	0.0000	109.00	1" Ice	4.05	1.53	0.07
			0.00			No Ice	4.30	1.71	0.10
			1.00			1/2"	4.56	1.90	0.13

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft	CAAA Front ft ²	CAAA Side ft ²	Weight K	
TD-RRH8X20-25	B	From Leg	4.00	0.0000	109.00	No Ice	4.05	1.53	0.07
			0.00			1/2"	4.30	1.71	0.10
			1.00			Ice	4.56	1.90	0.13
						1" Ice			
TD-RRH8X20-25	C	From Leg	4.00	0.0000	109.00	No Ice	4.05	1.53	0.07
			0.00			1/2"	4.30	1.71	0.10
			1.00			Ice	4.56	1.90	0.13
						1" Ice			
PCS 1900MHZ 4X45W 65MHZ	A	From Leg	4.00	0.0000	109.00	No Ice	2.31	2.23	0.06
			0.00			1/2"	2.52	2.43	0.08
			1.00			Ice	2.73	2.64	0.11
						1" Ice			
PCS 1900MHZ 4X45W 65MHZ	B	From Leg	4.00	0.0000	109.00	No Ice	2.31	2.23	0.06
			0.00			1/2"	2.52	2.43	0.08
			1.00			Ice	2.73	2.64	0.11
						1" Ice			
PCS 1900MHZ 4X45W 65MHZ	C	From Leg	4.00	0.0000	109.00	No Ice	2.31	2.23	0.06
			0.00			1/2"	2.52	2.43	0.08
			1.00			Ice	2.73	2.64	0.11
						1" Ice			
(3) 6' x 2" Mount Pipe	A	From Leg	4.00	0.0000	109.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice			
(3) 6' x 2" Mount Pipe	B	From Leg	4.00	0.0000	109.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice			
(3) 6' x 2" Mount Pipe	C	From Leg	4.00	0.0000	109.00	No Ice	1.43	1.43	0.02
			0.00			1/2"	1.92	1.92	0.03
			0.00			Ice	2.29	2.29	0.05
						1" Ice			
Platform Mount [LP 1201-1]	B	None		0.0000	109.00	No Ice	23.10	23.10	2.10
						1/2"	26.80	26.80	2.50
						Ice	30.50	30.50	2.90
						1" Ice			
*** 99 P *** (2) LPA-80080/4CF	A	From Leg	4.00	0.0000	99.00	No Ice	2.62	5.40	0.01
			0.00			1/2"	2.92	5.73	0.05
			0.00			Ice	3.23	6.06	0.08
						1" Ice			
(2) LPA-80080/4CF	B	From Leg	4.00	0.0000	99.00	No Ice	2.62	5.40	0.01
			0.00			1/2"	2.92	5.73	0.05
			0.00			Ice	3.23	6.06	0.08
						1" Ice			
(2) LPA-80080/4CF	C	From Leg	4.00	0.0000	99.00	No Ice	2.62	5.40	0.01
			0.00			1/2"	2.92	5.73	0.05
			0.00			Ice	3.23	6.06	0.08
						1" Ice			
(2) JAHH-65B-R3B	A	From Leg	4.00	0.0000	99.00	No Ice	9.11	5.98	0.06
			0.00			1/2"	9.58	6.44	0.12
			0.00			Ice	10.05	6.91	0.18
						1" Ice			
(2) JAHH-65B-R3B	B	From Leg	4.00	0.0000	99.00	No Ice	9.11	5.98	0.06
			0.00			1/2"	9.58	6.44	0.12
			0.00			Ice	10.05	6.91	0.18
						1" Ice			
(2) JAHH-65B-R3B	C	From Leg	4.00	0.0000	99.00	No Ice	9.11	5.98	0.06
			0.00			1/2"	9.58	6.44	0.12
			0.00			Ice	10.05	6.91	0.18
						1" Ice			
RRH2x60-700	A	From Leg	4.00	0.0000	99.00	No Ice	3.50	1.82	0.06
			0.00			1/2"	3.76	2.05	0.08
			0.00			Ice	4.03	2.29	0.11
						1" Ice			

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		CA _{AA} Front ft ²	CA _{AA} Side ft ²	Weight K
RRH2x60-700	B	From Leg	4.00	0.0000	99.00	No Ice	3.50	1.82	0.06
			0.00			1/2"	3.76	2.05	0.08
			0.00			Ice	4.03	2.29	0.11
						1" Ice			
RRH2x60-700	C	From Leg	4.00	0.0000	99.00	No Ice	3.50	1.82	0.06
			0.00			1/2"	3.76	2.05	0.08
			0.00			Ice	4.03	2.29	0.11
						1" Ice			
RRH4X45-AWS4 B66	A	From Leg	4.00	0.0000	99.00	No Ice	2.66	1.59	0.06
			0.00			1/2"	2.88	1.77	0.08
			0.00			Ice	3.10	1.96	0.11
						1" Ice			
RRH4X45-AWS4 B66	B	From Leg	4.00	0.0000	99.00	No Ice	2.66	1.59	0.06
			0.00			1/2"	2.88	1.77	0.08
			0.00			Ice	3.10	1.96	0.11
						1" Ice			
RRH4X45-AWS4 B66	C	From Leg	4.00	0.0000	99.00	No Ice	2.66	1.59	0.06
			0.00			1/2"	2.88	1.77	0.08
			0.00			Ice	3.10	1.96	0.11
						1" Ice			
AIRSCALE RRH 4T4R B5 160W	A	From Leg	4.00	0.0000	99.00	No Ice	1.29	0.72	0.04
			0.00			1/2"	1.43	0.83	0.05
			0.00			Ice	1.58	0.96	0.06
						1" Ice			
AIRSCALE RRH 4T4R B5 160W	B	From Leg	4.00	0.0000	99.00	No Ice	1.29	0.72	0.04
			0.00			1/2"	1.43	0.83	0.05
			0.00			Ice	1.58	0.96	0.06
						1" Ice			
AIRSCALE RRH 4T4R B5 160W	C	From Leg	4.00	0.0000	99.00	No Ice	1.29	0.72	0.04
			0.00			1/2"	1.43	0.83	0.05
			0.00			Ice	1.58	0.96	0.06
						1" Ice			
(2) DB-T1-6Z-8AB-0Z	A	From Leg	4.00	0.0000	99.00	No Ice	4.80	2.00	0.04
			0.00			1/2"	5.07	2.19	0.08
			0.00			Ice	5.35	2.39	0.12
						1" Ice			
Platform Mount [LP 1301-1]	C	None		0.0000	99.00	No Ice	51.70	51.70	2.26
						1/2"	62.70	62.70	2.94
						Ice	73.70	73.70	3.61
						1" Ice			
88 ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00	0.0000	88.00	No Ice	6.33	5.64	0.11
			0.00			1/2"	6.78	6.43	0.17
			2.00			Ice	7.21	7.13	0.23
						1" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00	0.0000	88.00	No Ice	6.33	5.64	0.11
			0.00			1/2"	6.78	6.43	0.17
			2.00			Ice	7.21	7.13	0.23
						1" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.00	0.0000	88.00	No Ice	6.33	5.64	0.11
			0.00			1/2"	6.78	6.43	0.17
			2.00			Ice	7.21	7.13	0.23
						1" Ice			
LNX-6515DS-A1M w/ Mount Pipe	A	From Leg	4.00	0.0000	88.00	No Ice	11.68	9.84	0.08
			0.00			1/2"	12.40	11.37	0.17
			2.00			Ice	13.14	12.91	0.27
						1" Ice			
LNX-6515DS-A1M w/ Mount Pipe	B	From Leg	4.00	0.0000	88.00	No Ice	11.68	9.84	0.08
			0.00			1/2"	12.40	11.37	0.17
			2.00			Ice	13.14	12.91	0.27
						1" Ice			
LNX-6515DS-A1M w/ Mount Pipe	C	From Leg	4.00	0.0000	88.00	No Ice	11.68	9.84	0.08
			0.00			1/2"	12.40	11.37	0.17
			2.00			Ice	13.14	12.91	0.27
						1" Ice			

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t	Placement ft	CAAA Front ft ²	CAAA Side ft ²	Weight K	
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	A	From Leg	4.00	0.0000	88.00	No Ice	6.33	5.64	0.11
			0.00			1/2" Ice	6.78	6.43	0.17
			2.00			Ice	7.21	7.13	0.23
						1" Ice			
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	B	From Leg	4.00	0.0000	88.00	No Ice	6.33	5.64	0.11
			0.00			1/2" Ice	6.78	6.43	0.17
			2.00			Ice	7.21	7.13	0.23
						1" Ice			
ERICSSON AIR 21 B4A B2P w/ Mount Pipe	C	From Face	4.00	0.0000	88.00	No Ice	6.33	5.64	0.11
			0.00			1/2" Ice	6.78	6.43	0.17
			2.00			Ice	7.21	7.13	0.23
						1" Ice			
T-Arm Mount [TA 602-3]	B	None		0.0000	88.00	No Ice	11.59	11.59	0.77
						1/2" Ice	15.44	15.44	0.99
						Ice	19.29	19.29	1.21
						1" Ice			

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp

Comb. No.	Description
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	120 - 97	Pole	Max Tension	14	0.00	0.00	0.00
			Max. Compression	26	-22.29	-0.05	0.81
			Max. Mx	8	-8.68	-103.55	0.12
			Max. My	2	-8.68	-0.01	103.73
			Max. Vy	8	7.76	-103.55	0.12
			Max. Vx	2	-7.76	-0.01	103.73
			Max. Torque	9			0.49
L2	97 - 48	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-51.67	-2.30	2.44
			Max. Mx	8	-21.31	-848.40	-0.04
			Max. My	2	-21.30	-0.30	857.10
			Max. Vy	8	17.70	-848.40	-0.04
			Max. Vx	2	-17.90	-0.30	857.10
			Max. Torque	13			0.81
L3	48 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-69.92	-2.30	2.44
			Max. Mx	8	-33.67	-1861.66	-0.49
			Max. My	2	-33.67	0.15	1880.79
			Max. Vy	8	20.54	-1861.66	-0.49
			Max. Vx	2	-20.74	0.15	1880.79
			Max. Torque	13			0.81

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	27	69.92	-0.00	6.64
	Max. H _x	20	33.69	20.52	0.01
	Max. H _z	2	33.69	0.01	20.71
	Max. M _x	2	1880.79	0.01	20.71
	Max. M _z	8	1861.66	-20.52	-0.01
	Max. Torsion	13	0.80	-10.27	-17.94
	Min. Vert	19	25.26	17.77	-10.35
	Min. H _x	8	33.69	-20.52	-0.01
	Min. H _z	14	33.69	-0.01	-20.71
	Min. M _x	14	-1880.20	-0.01	-20.71
	Min. M _z	20	-1860.38	20.52	0.01
	Min. Torsion	25	-0.80	10.27	17.94

Tower Mast Reaction Summary

120 Ft Monopole Tower Structural Analysis
 Project Number 1549730, Order 377565, Revision 6

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	28.07	0.00	0.00	-0.23	-0.50	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	33.69	-0.01	-20.71	-1880.79	0.15	0.72
0.9 Dead+1.6 Wind 0 deg - No Ice	25.26	-0.01	-20.71	-1863.36	0.31	0.72
1.2 Dead+1.6 Wind 30 deg - No Ice	33.69	10.25	-17.93	-1628.47	-930.46	0.44
0.9 Dead+1.6 Wind 30 deg - No Ice	25.26	10.25	-17.93	-1613.36	-921.71	0.45
1.2 Dead+1.6 Wind 60 deg - No Ice	33.69	17.77	-10.35	-939.87	-1611.94	0.05
0.9 Dead+1.6 Wind 60 deg - No Ice	25.26	17.77	-10.35	-931.12	-1596.90	0.05
1.2 Dead+1.6 Wind 90 deg - No Ice	33.69	20.52	0.01	0.49	-1861.66	-0.36
0.9 Dead+1.6 Wind 90 deg - No Ice	25.26	20.52	0.01	0.56	-1844.32	-0.36
1.2 Dead+1.6 Wind 120 deg - No Ice	33.69	17.77	10.36	940.65	-1612.72	-0.67
0.9 Dead+1.6 Wind 120 deg - No Ice	25.26	17.77	10.36	932.04	-1597.67	-0.67
1.2 Dead+1.6 Wind 150 deg - No Ice	33.69	10.27	17.94	1628.67	-931.82	-0.80
0.9 Dead+1.6 Wind 150 deg - No Ice	25.26	10.27	17.94	1613.71	-923.06	-0.80
1.2 Dead+1.6 Wind 180 deg - No Ice	33.69	0.01	20.71	1880.20	-1.42	-0.72
0.9 Dead+1.6 Wind 180 deg - No Ice	25.26	0.01	20.71	1862.92	-1.25	-0.72
1.2 Dead+1.6 Wind 210 deg - No Ice	33.69	-10.25	17.93	1627.88	929.19	-0.44
0.9 Dead+1.6 Wind 210 deg - No Ice	25.26	-10.25	17.93	1612.93	920.77	-0.44
1.2 Dead+1.6 Wind 240 deg - No Ice	33.69	-17.77	10.35	939.29	1610.66	-0.05
0.9 Dead+1.6 Wind 240 deg - No Ice	25.26	-17.77	10.35	930.69	1595.95	-0.05
1.2 Dead+1.6 Wind 270 deg - No Ice	33.69	-20.52	-0.01	-1.08	1860.38	0.36
0.9 Dead+1.6 Wind 270 deg - No Ice	25.26	-20.52	-0.01	-0.99	1843.37	0.36
1.2 Dead+1.6 Wind 300 deg - No Ice	33.69	-17.77	-10.36	-941.23	1611.45	0.67
0.9 Dead+1.6 Wind 300 deg - No Ice	25.26	-17.77	-10.36	-932.47	1596.73	0.67
1.2 Dead+1.6 Wind 330 deg - No Ice	33.69	-10.27	-17.94	-1629.25	930.55	0.80
0.9 Dead+1.6 Wind 330 deg - No Ice	25.26	-10.27	-17.94	-1614.14	922.12	0.80
1.2 Dead+1.0 Ice+1.0 Temp	69.92	0.00	-0.00	-2.44	-2.30	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	69.92	0.00	-6.64	-621.67	-2.53	0.20
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	69.92	3.31	-5.75	-538.79	-310.50	0.11
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	69.92	5.73	-3.32	-312.22	-535.91	-0.00
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	69.92	6.61	-0.00	-2.68	-618.37	-0.11
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	69.92	5.73	3.32	306.89	-535.78	-0.20
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	69.92	3.31	5.75	533.55	-310.27	-0.23
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	69.92	-0.00	6.64	616.56	-2.27	-0.20
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	69.92	-3.31	5.75	533.68	305.69	-0.11
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	69.92	-5.73	3.32	307.12	531.10	0.00

Load Combination	Vertical	Shear _x	Shear _z	Overturing Moment, M _x	Overturing Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	69.92	-6.61	0.00	-2.42	613.56	0.11
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	69.92	-5.73	-3.32	-312.00	530.97	0.20
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	69.92	-3.31	-5.75	-538.66	305.46	0.23
Dead+Wind 0 deg - Service	28.07	-0.00	-4.82	-435.50	-0.35	0.17
Dead+Wind 30 deg - Service	28.07	2.39	-4.17	-377.10	-215.75	0.10
Dead+Wind 60 deg - Service	28.07	4.14	-2.41	-217.72	-373.48	0.01
Dead+Wind 90 deg - Service	28.07	4.78	0.00	-0.06	-431.28	-0.08
Dead+Wind 120 deg - Service	28.07	4.14	2.41	217.54	-373.66	-0.16
Dead+Wind 150 deg - Service	28.07	2.39	4.18	376.79	-216.06	-0.19
Dead+Wind 180 deg - Service	28.07	0.00	4.82	435.02	-0.71	-0.17
Dead+Wind 210 deg - Service	28.07	-2.39	4.17	376.61	214.69	-0.10
Dead+Wind 240 deg - Service	28.07	-4.14	2.41	217.23	372.42	-0.01
Dead+Wind 270 deg - Service	28.07	-4.78	-0.00	-0.42	430.22	0.08
Dead+Wind 300 deg - Service	28.07	-4.14	-2.41	-218.03	372.60	0.16
Dead+Wind 330 deg - Service	28.07	-2.39	-4.18	-377.28	215.00	0.19

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-28.07	0.00	0.00	28.07	0.00	0.000%
2	-0.01	-33.69	-20.71	0.01	33.69	20.71	0.000%
3	-0.01	-25.26	-20.71	0.01	25.26	20.71	0.000%
4	10.25	-33.69	-17.93	-10.25	33.69	17.93	0.000%
5	10.25	-25.26	-17.93	-10.25	25.26	17.93	0.000%
6	17.77	-33.69	-10.35	-17.77	33.69	10.35	0.000%
7	17.77	-25.26	-10.35	-17.77	25.26	10.35	0.000%
8	20.52	-33.69	0.01	-20.52	33.69	-0.01	0.000%
9	20.52	-25.26	0.01	-20.52	25.26	-0.01	0.000%
10	17.77	-33.69	10.36	-17.77	33.69	-10.36	0.000%
11	17.77	-25.26	10.36	-17.77	25.26	-10.36	0.000%
12	10.27	-33.69	17.94	-10.27	33.69	-17.94	0.000%
13	10.27	-25.26	17.94	-10.27	25.26	-17.94	0.000%
14	0.01	-33.69	20.71	-0.01	33.69	-20.71	0.000%
15	0.01	-25.26	20.71	-0.01	25.26	-20.71	0.000%
16	-10.25	-33.69	17.93	10.25	33.69	-17.93	0.000%
17	-10.25	-25.26	17.93	10.25	25.26	-17.93	0.000%
18	-17.77	-33.69	10.35	17.77	33.69	-10.35	0.000%
19	-17.77	-25.26	10.35	17.77	25.26	-10.35	0.000%
20	-20.52	-33.69	-0.01	20.52	33.69	0.01	0.000%
21	-20.52	-25.26	-0.01	20.52	25.26	0.01	0.000%
22	-17.77	-33.69	-10.36	17.77	33.69	10.36	0.000%
23	-17.77	-25.26	-10.36	17.77	25.26	10.36	0.000%
24	-10.27	-33.69	-17.94	10.27	33.69	17.94	0.000%
25	-10.27	-25.26	-17.94	10.27	25.26	17.94	0.000%
26	0.00	-69.92	0.00	-0.00	69.92	0.00	0.000%
27	0.00	-69.92	-6.64	-0.00	69.92	6.64	0.000%
28	3.31	-69.92	-5.75	-3.31	69.92	5.75	0.000%
29	5.73	-69.92	-3.32	-5.73	69.92	3.32	0.000%
30	6.61	-69.92	-0.00	-6.61	69.92	0.00	0.000%
31	5.73	-69.92	3.32	-5.73	69.92	-3.32	0.000%
32	3.30	-69.92	5.75	-3.31	69.92	-5.75	0.000%
33	-0.00	-69.92	6.64	0.00	69.92	-6.64	0.000%
34	-3.31	-69.92	5.75	3.31	69.92	-5.75	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
35	-5.73	-69.92	3.32	5.73	69.92	-3.32	0.000%
36	-6.61	-69.92	0.00	6.61	69.92	-0.00	0.000%
37	-5.73	-69.92	-3.32	5.73	69.92	3.32	0.000%
38	-3.30	-69.92	-5.75	3.31	69.92	5.75	0.000%
39	-0.00	-28.07	-4.82	0.00	28.07	4.82	0.000%
40	2.39	-28.07	-4.17	-2.39	28.07	4.17	0.000%
41	4.14	-28.07	-2.41	-4.14	28.07	2.41	0.000%
42	4.78	-28.07	0.00	-4.78	28.07	-0.00	0.000%
43	4.14	-28.07	2.41	-4.14	28.07	-2.41	0.000%
44	2.39	-28.07	4.18	-2.39	28.07	-4.18	0.000%
45	0.00	-28.07	4.82	-0.00	28.07	-4.82	0.000%
46	-2.39	-28.07	4.17	2.39	28.07	-4.17	0.000%
47	-4.14	-28.07	2.41	4.14	28.07	-2.41	0.000%
48	-4.78	-28.07	-0.00	4.78	28.07	0.00	0.000%
49	-4.14	-28.07	-2.41	4.14	28.07	2.41	0.000%
50	-2.39	-28.07	-4.18	2.39	28.07	4.18	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00059979
3	Yes	4	0.00000001	0.00038807
4	Yes	5	0.00000001	0.00062083
5	Yes	5	0.00000001	0.00029154
6	Yes	5	0.00000001	0.00061775
7	Yes	5	0.00000001	0.00029025
8	Yes	4	0.00000001	0.00054915
9	Yes	4	0.00000001	0.00035463
10	Yes	5	0.00000001	0.00059658
11	Yes	5	0.00000001	0.00027977
12	Yes	5	0.00000001	0.00063434
13	Yes	5	0.00000001	0.00029846
14	Yes	4	0.00000001	0.00062332
15	Yes	4	0.00000001	0.00040370
16	Yes	5	0.00000001	0.00060645
17	Yes	5	0.00000001	0.00028477
18	Yes	5	0.00000001	0.00060680
19	Yes	5	0.00000001	0.00028524
20	Yes	4	0.00000001	0.00057182
21	Yes	4	0.00000001	0.00036983
22	Yes	5	0.00000001	0.00063160
23	Yes	5	0.00000001	0.00029744
24	Yes	5	0.00000001	0.00059657
25	Yes	5	0.00000001	0.00027956
26	Yes	4	0.00000001	0.00003577
27	Yes	5	0.00000001	0.00040285
28	Yes	5	0.00000001	0.00056999
29	Yes	5	0.00000001	0.00056992
30	Yes	5	0.00000001	0.00040033
31	Yes	5	0.00000001	0.00054942
32	Yes	5	0.00000001	0.00056050
33	Yes	5	0.00000001	0.00039575
34	Yes	5	0.00000001	0.00054490
35	Yes	5	0.00000001	0.00054329
36	Yes	5	0.00000001	0.00039457
37	Yes	5	0.00000001	0.00056354
38	Yes	5	0.00000001	0.00055405
39	Yes	4	0.00000001	0.00004292
40	Yes	4	0.00000001	0.00021012
41	Yes	4	0.00000001	0.00020740
42	Yes	4	0.00000001	0.00004033
43	Yes	4	0.00000001	0.00018655
44	Yes	4	0.00000001	0.00022576

45	Yes	4	0.00000001	0.00004306
46	Yes	4	0.00000001	0.00019417
47	Yes	4	0.00000001	0.00019523
48	Yes	4	0.00000001	0.00004038
49	Yes	4	0.00000001	0.00022330
50	Yes	4	0.00000001	0.00018576

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 97	11.771	39	0.8110	0.0012
L2	100.62 - 48	8.530	39	0.7719	0.0011
L3	52.96 - 0	2.334	39	0.4112	0.0003

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
119.00	(2) 7770.00 w/ Mount Pipe	39	11.601	0.8099	0.0012	56355
109.00	ETCR-654L12H6 w/ Mount Pipe	39	9.911	0.7953	0.0011	25616
99.00	(2) LPA-80080/4CF	39	8.268	0.7655	0.0011	13713
88.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	39	6.563	0.7054	0.0009	9729

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 97	50.878	2	3.5058	0.0054
L2	100.62 - 48	36.872	2	3.3377	0.0047
L3	52.96 - 0	10.086	2	1.7778	0.0014

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
119.00	(2) 7770.00 w/ Mount Pipe	2	50.144	3.5009	0.0053	13175
109.00	ETCR-654L12H6 w/ Mount Pipe	2	42.843	3.4384	0.0050	5988
99.00	(2) LPA-80080/4CF	2	35.743	3.3099	0.0046	3202
88.00	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	2	28.371	3.0503	0.0039	2265

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	KI/r	A in ²	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	120 - 97 (1)	TP28.93x22.69x0.1875	23.00	0.00	0.0	16.520 9	-8.68	1079.70	0.008
L2	97 - 48 (2)	TP39.7x27.5729x0.25	52.62	0.00	0.0	30.396 5	-21.30	1957.24	0.011
L3	48 - 0 (3)	TP51.04x38.0569x0.3125	52.96	0.00	0.0	50.315 3	-33.67	3154.51	0.011

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	120 - 97 (1)	TP28.93x22.69x0.1875	103.73	617.02	0.168	0.00	617.02	0.000
L2	97 - 48 (2)	TP39.7x27.5729x0.25	857.11	1543.79	0.555	0.00	1543.79	0.000
L3	48 - 0 (3)	TP51.04x38.0569x0.3125	1880.79	3296.10	0.571	0.00	3296.10	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	120 - 97 (1)	TP28.93x22.69x0.1875	7.76	539.85	0.014	0.00	1235.55	0.000
L2	97 - 48 (2)	TP39.7x27.5729x0.25	17.90	970.51	0.018	0.72	3091.35	0.000
L3	48 - 0 (3)	TP51.04x38.0569x0.3125	20.74	1567.17	0.013	0.72	6600.26	0.000

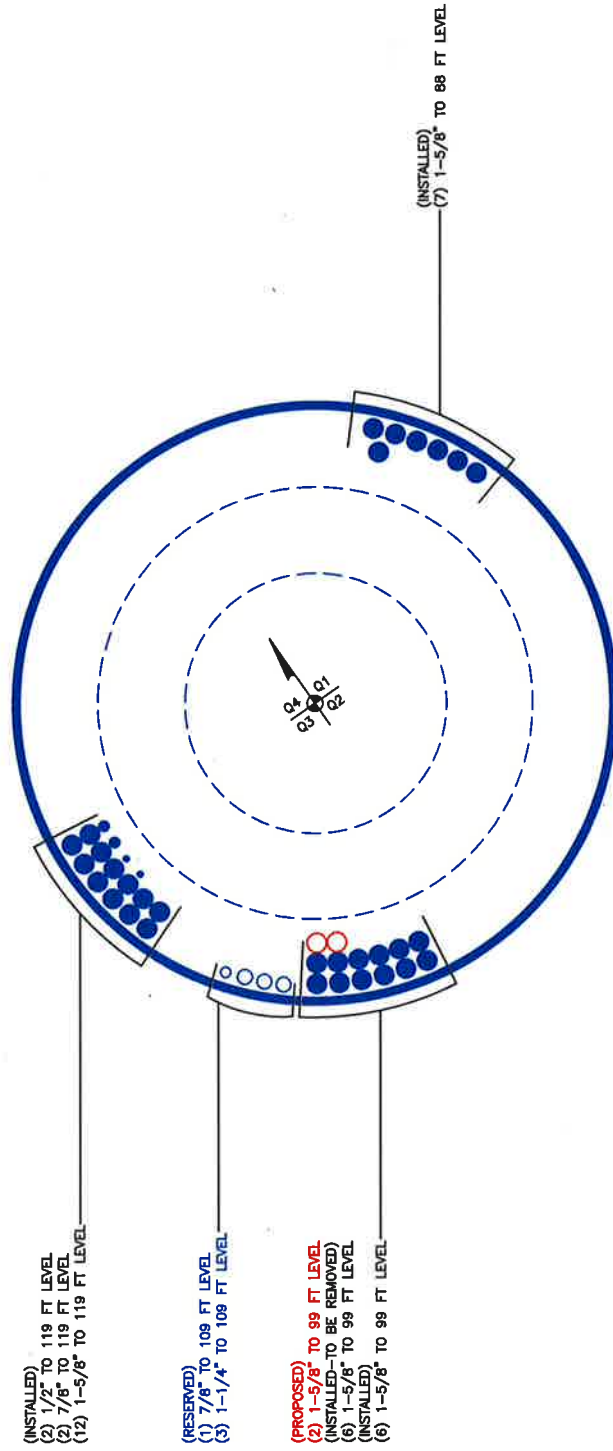
Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	120 - 97 (1)	0.008	0.168	0.000	0.014	0.000	0.176	1.000	4.8.2
L2	97 - 48 (2)	0.011	0.555	0.000	0.018	0.000	0.566	1.000	4.8.2
L3	48 - 0 (3)	0.011	0.571	0.000	0.013	0.000	0.581	1.000	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	120 - 97	Pole	TP28.93x22.69x0.1875	1	-8.68	1079.70	17.6	Pass
L2	97 - 48	Pole	TP39.7x27.5729x0.25	2	-21.30	1957.24	56.6	Pass
L3	48 - 0	Pole	TP51.04x38.0569x0.3125	3	-33.67	3154.51	58.1	Pass
Summary								
Pole (L3)							58.1	Pass
RATING =							58.1	Pass

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS

Stiffened or Unstiffened, UngROUTed, Circular Base Plate - Any Rod Material

TIA Rev G Assumption: Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data	
BU#:	845993
Site Name:	BURLINGTON-NEPAUG ROAD
App #:	377565 Rev. 6
Pole Manufacturer:	Other

Anchor Rod Data	
Qty:	12
Diam:	2.25 in
Rod Material:	A615-J
Strength (Fu):	100 ksi
Yield (Fy):	75 ksi
Bolt Circle:	60 in

Plate Data	
Diam:	66 in
Thick:	2.25 in
Grade:	36 ksi
Single-Rod B-eff:	13.50 in

Stiffener Data (Welding at both sides)	
Config:	0 *
Weld Type:	
Groove Depth:	<-- Disregard
Groove Angle:	<-- Disregard
Fillet H. Weld:	in
Fillet V. Weld:	in
Width:	in
Height:	in
Thick:	in
Notch:	in
Grade:	ksi
Weld str.:	ksi

Pole Data	
Diam:	51.04 in
Thick:	0.3125 in
Grade:	65 ksi
# of Sides:	18 "0" IF Round
Fu	80 ksi
Reinf. Fillet Weld	0 "0" if None

Reactions		
Mu:	1881	ft-kips
Axial, Pu:	34	kips
Shear, Vu:	21	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

If No stiffeners, Criteria: **AISC LRFD** <-Only Applicable to Unstiffened Cases

Anchor Rod Results

Max Rod ($C_u + V_u/\eta$): 131.6 Kips
 Allowable Axial, $\Phi * F_u * A_{net}$: 260.0 Kips
 Anchor Rod Stress Ratio: 50.6% **Pass**

Rigid
AISC LRFD
$\phi * T_n$

Base Plate Results

Base Plate Stress: 21.5 ksi
 Allowable Plate Stress: 32.4 ksi
 Base Plate Stress Ratio: 66.3% **Pass**

Flexural Check

Rigid
AISC LRFD
$\phi * F_y$
Y.L. Length: 31.54

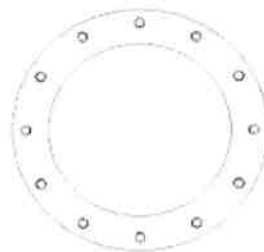
n/a

Stiffener Results

Horizontal Weld : n/a
 Vertical Weld: n/a
 Plate Flex+Shear, $f_b/F_b + (f_v/F_v)^2$: n/a
 Plate Tension+Shear, $f_t/F_t + (f_v/F_v)^2$: n/a
 Plate Comp. (AISC Bracket): n/a

Pole Results

Pole Punching Shear Check: n/a



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Pier and Pad Foundation



BU # : 845993
Site Name: BURLINGTON-NE
App. Number: 377565 Rev.6

TIA-222 Revision: G
Tower Type: Monopole

Block Foundation?:

Superstructure Analysis Reactions		
Compression, P_{comp} :	34	kips
Base Shear, V_u comp:	21	kips
Moment, M_u :	1881	ft-kips
Tower Height, H :	120	ft
BP Dist. Above Fdn, $b_{p_{dist}}$:	6.125	in

Foundation Analysis Checks				
	Capacity	Demand	Rating	Check
<i>Lateral (Sliding) (kips)</i>	171.93	21.00	12.2%	Pass
<i>Bearing Pressure (ksf)</i>	9.00	1.37	15.2%	Pass
<i>Overturing (kip*ft)</i>	4663.12	2015.62	43.2%	Pass
<i>Pier Flexure (Comp.) (kip*ft)</i>	3898.46	1941.90	49.8%	Pass
<i>Pier Compression (kip)</i>	31187.52	59.58	0.2%	Pass
<i>Pad Flexure (kip*ft)</i>	3285.13	669.25	20.4%	Pass
<i>Pad Shear - 1-way (kips)</i>	896.51	103.49	11.5%	Pass
<i>Pad Shear - 2-way (ksi)</i>	0.19	0.02	10.5%	Pass

Soil Rating: 43.2%
Structural Rating: 49.8%

Pier Properties		
Pier Shape:	Square	
Pier Diameter, d_{pier} :	7.0	ft
Ext. Above Grade, E :	0.90	ft
Pier Rebar Size, Sc :	8	
Pier Rebar Quantity, mc :	30	
Pier Tie/Spiral Size, St :	3	
Pier Tie/Spiral Quantity, mt :	4	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier} :	6	in

Pad Properties		
Depth, D :	5.0	ft
Pad Width, W :	25.0	ft
Pad Thickness, T :	3.0	ft
Pad Rebar Size, Sp :	8	
Pad Rebar Quantity, mp :	30	
Pad Clear Cover, cc_{pad} :	3	in

Material Properties		
Rebar Grade, F_y :	60000	psi
Concrete Compressive Strength, F'_c :	4000	psi
Dry Concrete Density, δ_c :	150	pcf

Soil Properties		
Total Soil Unit Weight, γ :	120	pcf
Ultimate Gross Bearing, Q_{ult} :	12.000	ksf
Cohesion, C_u :	0.000	ksf
Friction Angle, ϕ :	30	degrees
SPT Blow Count, N_{blows} :	27	
Base Friction, μ :	0.45	
Neglected Depth, N :	3.50	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, gw :	4	ft

<--Toggle between Gross and Net

Anchor Rods - Shear, Axial and Bending Interaction Check

TIA-222-G Section 4.9.9



Description:

Applies to detail type (d) anchors when the clear distance from the top of the concrete to the bottom leveling nut exceeds 1.0 times the diameter of the anchor rod.

Assumptions:

1. The tower is a monopole.
2. The anchor rods are evenly spaced in a circular pattern.

1. INPUTS

Tower Reactions (from tnxTower)

Base Moment: $M := 1881 \text{ kip}\cdot\text{ft}$

Axial Force: $P := 34 \text{ kip}$

Base Shear: $V_w := 21 \text{ kip}$

Anchor Rods Properties

Number of Anchors: $N_w := 12$

Bolt Circle Diameter: $BC := 60 \text{ in}$

Yield Strength of Rods: $F_y := 75 \text{ ksi}$

Ultimate Strength of Rods: $F_{ub} := 100 \text{ ksi}$

Distance from Bottom Nut to Concrete: $l_{ar} := 3.875 \cdot \text{in}$

Rod Diameter:

Per photos, are the bolts threaded at the top of the concrete?:

Not Threaded
 Threaded

[Section 4.9.6.3(a) applies]

[Section 4.9.6.3(b) applies]

Gross Area: $A_b := \frac{1}{4} \cdot \pi \cdot d^2 = 3.98 \cdot \text{in}^2$

Net Area: $A_n = 3.25 \cdot \text{in}^2$

Moment of Inertia of Group: $I := \frac{1}{8} \cdot N \cdot A_n \cdot BC^2 = 17550 \cdot \text{in}^4$

2. CALCULATIONS

Shear Force per Anchor

$$V_u := \frac{V}{N} = 1.75 \cdot \text{kip}$$

Maximum Axial Force per Anchor

$$P_u := \frac{M \cdot (0.5 \cdot BC)}{I} \cdot A_n + \frac{P}{N} = 128.23 \cdot \text{kip}$$

Bending Moment (due to Shear)

[TIA-222-G Section 4.9.9]

$$M_u := 0.65 \cdot l_{ar} \cdot V_u = 4.41 \cdot \text{kip} \cdot \text{in}$$

Shear Strength

[TIA-222-G Section 4.9.6.3]

Thread Factor:

$$t_h = 0.45$$

Strength:

$$\phi R_{nv} := 0.75 \cdot (t_h) \cdot F_{ub} \cdot A_b = 134.19 \cdot \text{kip}$$

Tensile Strength

[TIA-222-G Section 4.9.6.1]

$$\phi R_{nt} := 0.8 \cdot F_{ub} \cdot A_n = 260 \cdot \text{kip}$$

Flexural Strength

[TIA-222-G Section 4.7.1]

Per Section 4.9.9, calculate "Z" based on the tensile root diameter of the rod:

Tensile Root Diameter:
(back-calculated)

$$d_{tr} := \sqrt{\frac{4 \cdot A_n}{\pi}} = 2.03 \cdot \text{in}$$

Plastic Modulus:

$$Z := \frac{1}{6} \cdot d_{tr}^3 = 1.4 \cdot \text{in}^3$$

Strength:

$$\phi R_{nm} := 0.9 \cdot F_y \cdot Z = 94.7 \cdot \text{kip} \cdot \text{in}$$

Capacity Check

[TIA-222-G Section 4.9.9]

Interaction Equation:

$$\text{Capacity} := \left(\frac{V_u}{\phi R_{nv}} \right)^2 + \left[\left(\frac{P_u}{\phi R_{nt}} \right) + \left(\frac{M_u}{\phi R_{nm}} \right) \right]^2$$

Capacity = 29.2%

Check = "Okay"

SUMMARY

1. Inputs

1.1 Tower Reactions

Base Moment: $M = 1881 \cdot \text{kip} \cdot \text{ft}$

Axial Shear: $P = 34 \cdot \text{kip}$

Base Shear: $V = 21 \cdot \text{kip}$

1.2 Anchor Rods Properties

Number of Anchors: $N = 12$

Rod Diameter: $d = 2.25 \cdot \text{in}$

Yield Strength: $F_y = 75 \cdot \text{ksi}$

2. Calculations

Shear Force per Anchor: $V_u = 1.75 \cdot \text{kip}$

Axial Force per Anchor: $P_u = 128.23 \cdot \text{kip}$

Bending Moment per Anchor: $M_u = 4.41 \cdot \text{kip} \cdot \text{in}$

Shear Strength: $\phi R_{nv} = 134.19 \cdot \text{kip}$

Tensile Strength: $\phi R_{nt} = 260 \cdot \text{kip}$

Flexural Strength: $\phi R_{nm} = 94.7 \cdot \text{kip} \cdot \text{in}$

Capacity: **Capacity = 29.15%**

Capacity Check: **Check = "Okay"**

CCISeismic - Design Category

Per 2012/2015 IBC

Site BU: 845993
 Work Order: 1549730
 Application: 377565 Rev. 6



	Degrees	Minutes	Seconds		
Site Latitude =	41	46	56.85	41.7825	degrees
Site Longitude =	-72	59	22.67	-72.9896	degrees
Ground Supported Structure =	Yes				
Structure Class =	II				(Table 2-1)
Site Class =	D - Stiff Soil				(Table 2-11)
Spectral response acceleration short periods, S_s =	0.182				USGS Seismic Tool
Spectral response acceleration 1 s period, S_1 =	0.064				
Importance Factor, I =	1.0				(Table 2-3)
Acceleration-based site coefficient, F_a =	1.6				(Table 2-12)
Velocity-based site coefficient, F_v =	2.4				(Table 2-13)
Design spectral response acceleration short period, S_{DS} =	0.194				(2.7.6)
Design spectral response acceleration 1 s period, S_{D1} =	0.102				(2.7.6)
Seismic Design Category - Short Period Response =	B				ASCE 7-05 Table 11.6-1
Seismic Design Category - 1s Period Response =	B				ASCE 7-05 Table 11.6-2
Worst Case Seismic Design Category =	B				ASCE 7-05 Tables 11.6-1 and 6-2